

## The Standard ~~HOW~~ Write-up Categories

1. *Problem Statement:* State the problem clearly in your own words. Your problem statement should be clear enough that someone unfamiliar with the problem could understand what it is that you are being asked to do.
2. *Process:* Describe what you did in attempting to solve the problem, using your notes as a reminder. Include things that didn't work out or that seemed like a waste of time. Do this part of the write-up even if you didn't solve the problem.

If you get assistance of any kind on the problem, you should indicate what the assistance was and how it helped you.

3. *Solution:* State your solution as clearly as you can. Explain how you know that your solution is correct and complete. (If you obtained only a partial solution, give that. If you were able to generalize the problem, include your general results.)

Your explanation should be written in a way that will be convincing to someone else—even someone who initially disagrees with your answer.

4. *Extensions:* Invent some extensions or variations to the problem. That is, write down some related problems. They can be easier, harder, or about the same level of difficulty as the original problem. (You don't have to solve these additional problems.)
5. *Evaluation:* Discuss your personal reaction to the problem. For example, you might respond to the questions below.
  - Did you consider it educationally worthwhile? What did you learn from it?
  - How would you change the problem to make it better?
  - Did you enjoy working on it?
  - Was it too hard or too easy?

## The gambler's Fallacy

### Introduction-

In the game of roulette, a ball is spun around in a roulette wheel, and it lands either in a red slot or in a black slot ( There's also a very small chance that it will land in a green slot, but in this problem, we will simplify things by ignoring that fact.) The chance of the ball landing in a red slot is the same as its chance of landing in a black slot.

Some gambler's use the following strategy for winning at roulette: They watch a wheel and if it gets a certain number of reds in a row, they bet on black, since they figure it black's turn. Similarly, if they see a string of blacks coming up, they bet on red, since they figure red will be more likely than black after a string of blacks.

### The experiment:

Do this experiment with a partner.

Flip a coin 25 times, and record each flip as heads (H) or tails (T), according to the outcome.

When you have completed all 25 flips, you will get a list of 25 letters, made up of H's and T's. Now start from the beginning of this list and find the first instance of three flips in a row that are identical (either three heads in a row or three tails in a row). We will call three identical flips in a row a triplet.

Record whether the flip that followed this first triplet was the same as the letters in the triplet or different. Then move to the next triplet and again record whether the flip that followed it was the same as, or different from, the letters in the triplet. Continue in this way through your whole list (Note: ignore the last triplet at the end of your 25 flips, as nothing follows it) Then find out how many "same's" and how many "different's" you got. If you have four identical flips in a row, that gives you two triplets. For example, suppose you have HHHHT as part of your record. As shown below, the first three H's form a triplet that is followed by an H (a same); the second, third and fourth H's also form a triplet, followed by a T.